

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US03/17392

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : D06F 39/02

US CL : 8/158

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 8/158, 159; 68/5R, 12.14, 29, 30, 139

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A ✓	US 82,722 A (KELLY) 06 OCTOBER 1868 (06.10.1868).	1-18
A ✓	US 3,261,185 A (RIHR) 19 JULY 1966 (19.07.1966).	1-18
X ✓	US 3,633,538 A (HOEFLIN) 11 JANUARY 1972 (11.01.1972), see cols. 1-2.	5, 7, 16, 17
X ✓	US 3,698,095 A (GRAND et al.) 17 OCTOBER 1972 (17.10.1972), see cols. 1-16.	5, 7, 16, 17
A ✓	US 4,004,685 A (MIZUNO et al.) 25 JANUARY 1977 (25.01.1977).	1-18
A ✓	US 4,236,320 A (SCHWADIKE et al.) 02 DECEMBER 1980 (02.12.1980).	1-18
X ✓	US 4,254,139 A (HENDERICKSON et al.) 03 MARCH 1981 (03.03.1981), see cols. 1-10.	5, 7, 16, 17
X ✓	US 4,920,662 A (SEEBURGER) 01 MAY 1990 (01.05.1990), see cols. 1-6.	5, 6, 16, 17
A ✓	US 5,040,311 A (ROY) 20 AUGUST 1991 (20.08.1991).	1-18



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:		"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E"	earlier application or patent published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search

27 July 2003 (27.07.2003)

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20 AUG 2003

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C. (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5,147,715 A (THURMAN) 15 SEPTEMBER 1992 (15.09.1992), see cols. 1-6.	5, 7, 16, 17
A	US 5,980,583 A (STAUB et al.) 09 NOVEMBER 1999 (09.11.1999).	1-18
A	US 6,243,969 B1 (YEAZELL) 12 JUNE 2001 (12 JUNE 2001).	1-18